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A New Level Of Consistency for Medical Pouch Manufacturers *Solid State RF generators provide better process control and consistency*

The Challenge

When sealing complex medical pouches, blood bags, urinary bags and similar products, high consistency is required.

However, this isn't the case with most weld/seal systems using standard oscillator tube RF generators. Their low frequency and harmonics don't allow efficient power coupling; tending to dissipate power, only transferring half to the seal site. This degrading RF power leads to both a high level of bad seals and lower cycle times. Aside from the basic inefficiency of the equipment, users also experience excessively high power cost and high maintenance in tube replacement. As high voltage involved, changing power tubes is also a safety issue.



ONEX Automation, Duarte, CA, specializes in the design and manufacture of custom automated assembly machines, RF, robotic and inspection systems for medical device,

pharmaceutical and biotech companies. Known for its focused solutions, ONEX looks outside the box to develop innovative and sound solutions for process challenges such as this one.

Onik Bogosyan, president explains that to improve RF heating system efficiency, coupling methods needed a technology upgrade. “Instead of typical loading to the heat source, we looked at a unique direct coupling technology. This is similar to high end amplifier tuning as used to obtain maximum audio wattage for quality sound,” he says. “By direct coupling we were sure we would be able to transfer our amplified signal to the source with minimum loss in transaction.”

The concept of direct coupling allows the RF generator to run more efficiently and cooler, while getting the heat to the maximum desired temperature. The goal was to consistently deliver a more reliable and controllable process.

Moving to Solid State

ONEX turned to their expertise in solid state technology. Their 3KRF solid state crystal oscillator technology immediately eliminated the maintenance and operator safety issues, since it removed the use of all vacuum tubes including the oscillator tube. This in turn, eliminated the issue of RF power degradation, producing high quality seals with consistency and repeatability previously unknown in the RF welding industry.

“The solid state RF generation process provides a cleaner signal which can be efficiently tuned to the source,” Bogosyan says. “The solid state RF supply and auto tuner provide power transfer with minimal power loss. The analog signal allows the power to be set and maintained at any value throughout the seal cycle, then be quickly changed to perform a different seal cycle. The system uses 50% less power than RF welders based on oscillator tube technology.”

“We tested this technology on a complex medical pouch sealing application,” he adds. “The material was 0.009” thick and required very precise power control to prevent arching or over-melting. In addition to the thin material, the product had a valve port and a very small 0.064 in. diameter tube welded onto the pouch. Initially, we’d done power calculations based on standard a tube style generator which came to 2.3KW power for the parameter seal and 800W to weld the tubing. But, when we tested the dies using a conventional RF generator, we could not control the power efficiently and saw high variations, arching and material burn. When we tested the 3KRF solid state generator, we were able to achieve excellent results and the system only used only 1.2 KW versus 2.3KW power for parameter weld and 400W for the tubing weld.”

Bogosyan points out that having the output power controlled by an analog signal is important when the product to be sealed uses thin PVC film and small tubing welded on one side of the pouch. “On this particular application we were able to tune and control the RF power precisely and perform the tubing port seal at 400W and parameter seal at 1200W power, resulting in a high quality seal without burns or arcs during the weld cycle. This is impossible using tube style RF generators,” he says.

3KRF technology is composed of US Patented solid state RF-generators (100W to 10 KW) that use crystal oscillator technology. The 3KRF system generates very precise power to prevent arching or over-melting of the product, and weighs in at 20 to 40% less, with a footprint that fits into even the most limited production space (19” rack mount capable). The system is programmed by selecting process parameters stored in the system memory or PLC, accessed via touch-screen menus. This reduces set-up time from hours to minutes.

Because 3KRF technology is far less sensitive to complex material formulations, it allows ONEX to easily provide medical users a way to expand the envelope regarding their end

products. The technology is easily customized for highly application specific manual or automated systems. “We have accomplished applications that were virtually impossible to seal by creating RF welding fields,” Bogosyan says. “Crystal oscillator technology easily adapts to applications that couldn't be successfully done using other systems.”

Expanding Markets

ONEX systems are easily validated for all medical applications, specifically RF sealing process parameters. 3KRF systems were initially designed for use in the medical industry, however, Bogosyan says that he was pleasantly surprised at how adaptable the technology is for virtually any market. “Operators can be easily trained on an 3KRF system in a day,” he says. “Any manufacturer that needs optimal RF welding/sealing at half the energy cost will benefit, including automotive, packaging, military, office supply, recreational, flooring, air structure, pool liners and more.”

3KRF technology allows customers to achieve results far beyond standard tube style RF sealing machines resulting in higher quality products and repeatable processes. “This is a revolutionary process that has been proven with many systems already in the field,”

Bogosyan says.

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